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APPLICATION NUMBER: ***60/531,475***
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RELATED PCT APPLICATION NUMBER: ***PCT/US04/42696***

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV032731148US

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Rene L.	Cruz	La Jolla, California

Additional inventors are being named on the ______ *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

RESIDENTIAL BROADBAND ACCESS SYSTEM

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☑ Customer Number: 24978

OR

☐ Firm or Individual Name					
Address					
Address					
City		State		Zip	
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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 18

☐ Drawing(s) *Number of Sheets* ______

☐ Application Date Sheet. See 37 CFR 1.76

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☐ Other (specify) ______

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☑ Applicant claims small entity status. See 37 CFR 1.27.

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

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Respectfully submitted,

SIGNATURE [signature]

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RESOURCE SHARING BROADBAND ACCESS SYSTEM , METHODS, AND DEVICES

BACKGROUND OF THE INVENTION

Dial-up service is a common method of Internet access. Dial-up service uses a dial-up modem through which a computer makes phone calls to an Internet service provider. The dial-up modem transforms digital data from the personal computer into an analog signal for transmission through a phone line, and conversely converts incoming analog signals into digital data for the personal computer. Dial-up service is known to be slow. For example, viewing web pages with multimedia content, such as graphical images, is often unacceptably slow.

Broadband access addresses this problem by providing higher digital data rates than dial-up service. A "DSL" (Digital Subscriber Line) involves upgrading the dial-up modem to a higher speed modem, known as a DSL modem, as well as using an upgraded modem device at the Internet Service Provider (ISP) premises, also known as the "central office." The DSL approach uses existing copper wire, possibly upgraded along certain segments to increase it's capacity to carry digitized information. Often the DSL access line is a spare telephone line that is already connected to the client location, and the central office is owned and operated by the local telephone company. The data rates achievable by DSL are dependent on the distance between the client location and the central office, and range roughly between 100kbps-300kbps. A DSL connection is commonly called a broadband access line. There are many client locations, e.g., residential units, that are too far away from a central office to have DSL service available.

Another broadband access scheme most commonly used with residential clients makes use of the coaxial cable that passes through a residential unit, for purposes of providing television signals to the home, "Cable TV". A specialized modem, called a

cable modem, is attached the coaxial cable inside the residential unit. The cable modem facilitates digital communication between the residential unit and facilities owned by the cable TV operator (often called a "Multiple Services Operator" (MSO)). The MSO is attached to the Internet, and thus becomes an Internet service provider for the residential unit. The coaxial cable entering a residential unit is typically shared with other residential units in close geographic proximity, Since usage patterns of the Internet typically create bursty data traffic, the access speed seen by a single user is typically not substantially limited by the fact that the coaxial cable is shared by several neighbors. Peak data rates on the order of approximately 1 million bits per second (Mbps) are possible with cable modems, with current technology. This would be achieved, for example, if only one residential user in a neighborhood were using their Internet connection at a given time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a residential broadband access system in accordance with an embodiment of the invention;

FIG. 2 is a block diagram of a residence system for use with the residential broadband access system of FIG. 1.

DETAILED DESCRIPTION

A shared access broadband access system serving a plurality of geographically co-located clients, e.g. residences. Individual clients in a network of clients have a wired access line, which could be either a narrowband access line or a broadband access line.

The access system exploits these access line resources, as well as a wireless communication network that interconnects the clients. The wireless communication network facilitates the pooling together of the wired access lines, and clients connected to the wireless communication network then share the pooled access lines. Each client is thereby provided with an access medium that has a larger capacity to transport bursts of data than that provided by the wired access line of a single client. Clients in the wireless network are provided with shared access broadband access, without requiring each residential unit to have a dedicated broadband access line. The performance of existing wired broadband access lines can also be significantly improved with this invention.

In preferred embodiments of the invention, clients are residential units, such as houses or apartments. A high percentage of the units have a form of wired Internet access. In some preferred embodiments, each client has a wired Internet connection. However, methods and systems of the invention are fault tolerant to the loss of one or more client wired access connections. In some embodiments, a server may be part of the client wired network, for example to provide a baseline level of access by one or more broadband connections. This baseline connection is then enhanced by client wired access resources when such resources are available through the wireless network.

Clients are generally geographically located within the limits of the wireless network. Preferred embodiments where clients are residential units will now be discussed, while artisans will appreciate broader aspects of the invention from their description. Residential unit clients may exploit the bursty nature of data traffic generated by residential Internet users. In particular, in a local neighborhood of residential units, it is unlikely that all residences are using their access lines at the same time. The idle capacity of the access line of a residential user can be used to support the data transfer requests of an active user in another residential unit. A wireless communication network that interconnects the computer equipment in a local neighborhood facilitates the sharing of the access lines. All of the access lines in a neighborhood network are thus pooled together and shared, creating the capability for each residential unit to avail of the transmission capacity in all access lines if no other

residential unit has a need to transfer data at a given time. This will improve the speed of Internet access, for example web browsing, without requiring an upgrade of existing wired access lines to each residential unit, and thus provide for shared access broadband access at low cost.

Exemplary embodiments of the invention, as applied to a single neighborhood of residential units are an ISP-Unaware embodiment, Meta-ISP embodiment, and ISP-Aware embodiment. The ISP-Aware embodiment requires cooperation between the ISP that serves the residential units of the neighborhood, while in the other two embodiments the ISP or ISPs which serve the residential units do not need to cooperate or be aware that the disclosed invention is in operation. These three embodiments will now be discussed.

In the ISP-Unaware embodiment, traffic is split across the access lines of the neighborhood at the granularity of a TCP session. A wireless communication network interconnects gateway devices installed in each residential unit. The gateway device can be implemented in software inside a users personal computer, by a separate hardware device, or embedded into a wireless local area network (WLAN) access point. Each gateway device can act as a proxy, and all of the proxies in the neighborhood coordinate to share the access lines. A request made from a computer inside a residential unit to initiate a TCP session with an entity outside the neighborhood is redirected by the local proxy within the same residential unit to a remote proxy that resides in another residential unit, through the wireless communication network. The remote proxy then makes TCP session requests on behalf of the computer that originally made the TCP session request. After the session is initiated, data packets from the session that originate at the remote entity are then transported to the remote proxy. The remote proxy then forwards these data packets through the wireless community network to the local proxy, which in turn forwards the packets to the computer that originally initiated the session. Similarly, after the session is initiated, data packets originating at the computer that initiated the TCP session are redirected by the local proxy to the remote proxy via the wireless communication network. In turn, the remote proxy forwards these session data packets to the remote entity that was the original target of the TCP session request.

The network of proxies in the neighborhood thus forms a load balancing function, attempting to spread the TCP session requests from all residential units evenly across all of the access lines in the neighborhood.

Packets originating from a computer inside a residential unit that are not recognized as belonging to a session are transported through the residential access line that terminates at the residential unit, and thus do not need to be transported via the wireless communication network.

There are many existing session-oriented protocols in use in the Internet, such as TCP and RTP, and the disclosed invention can operate with any such session-oriented protocol. Since TCP is in very common use, I have described the embodiments above in terms of the TCP protocol.

Although the ISP-Unaware embodiment offers a potentially dramatic improvement in performance relative to when no sharing of access lines is used, there are two limitations. First, the granularity at which traffic is split across all of the access lines can be rather large, thus limiting the capability to spread load evenly across residential access lines. Second, traffic traveling between the Internet and a single residential unit passes through other residential units, raising privacy concerns.

The Meta-ISP embodiment is similar to the ISP-Unaware embodiment, except that each gateway device acts only as a local proxy. Instead of remote proxies being located at residential units throughout the neighborhood, a remote server acts as a remote proxy for all residential units. This remote server is called a proxy server, and is located outside the neighborhood, and outside the local-ISPs that terminate the residential access lines.

A request made from a computer inside a residential unit to initiate a TCP session with an entity outside the neighborhood is redirected by the local proxy within the same

residential unit to the proxy server. The proxy server then makes TCP session requests on behalf of the computer that originally made the TCP session request. After the session is initiated, data packets from the session that originate at the remote entity are then transported to the proxy server. The proxy server then forwards these data packets to the local proxy, which in turn forwards the packets to the computer that originally initiated the session. Similarly, after the session is initiated, data packets originating at the computer that initiated the TCP session are redirected by the local proxy to the proxy server. In turn, the proxy server forwards these session data packets to the remote entity that was the original target of the TCP session request.

In the above mechanism, the communication between the local proxy and the proxy server can take place by using any of the residential access lines, making use of the wireless communication network that interconnects the residential units. Traffic can be bifurcated across these residential access lines at the granularity of a packet, and thus the load can be evenly spread across the residential access lines. The local proxy and the proxy server can also implement packet reordering, to increase the chances that packets will be transported end-to-end in the same order they were originally sent. The packet reordering can be implemented with sequence numbers that are inserted into the packets traveling between the proxy server and the local proxy. In addition, the local proxy and proxy server can provide encryption and decryption to each packet that travels between them, thereby providing a degree of privacy between residential units.

Packets originating from a computer inside a residential unit that are not recognized as belonging to a session are transported through the residential access line that terminates at the residential unit, and thus do not need to be transported via the wireless communication network.

The Meta-ISP embodiment does not require cooperation from a local-ISP that terminates one or more of the residential access lines. Indeed, the proxy server is separate from any local-ISP. However, if all the residential access lines are terminated by the same local-ISP, and the local-ISP wishes to cooperate with the sharing of residential access

lines as disclosed in this invention, then the ISP-Aware embodiment is possible, which is discussed next.

The ISP-Aware is similar to the Meta-ISP embodiment, except that the proxy server is located within the equipment of the local-ISP that terminates all of the residential access lines. This allows a simplification of the proxy server. In particular, since all incoming traffic to the residential units must pass through the local-ISP, it is not necessary for the proxy server to initiate TCP sessions on behalf of the residential units. Instead, local proxies in the residential units, as well as the proxy server, can simply forward the packets initiating sessions without processing. However, as before, the proxy server and a local proxy can bifurcate the traffic traveling between them across all of the residential access lines, using the wireless communication network that interconnects the residential units. This bifurcation can be done at the granularity of a packet. Both the local proxies and the proxy server can perform packet reordering, encryption, and decryption, as in the Meta-ISP embodiment.

A preferred embodiment residential broadband access system will now be described with respect to FIGs. 1 and 2. Three preferred embodiments, termed ISP-Unaware, Meta-ISP, and ISP-Aware will be discussed. FIG 1 illustrates residential units 2001-2004, access lines 101-104, a wireless community network 1000, the Internet 3000, a proxy server 5000, web servers 4001-4002, and a host 4100.

Residential unit 2001-2004 is illustrated in FIG 2. A residential unit may contain one or more personal computers 51,52, interconnected by a Local Area Network (LAN) 40. A modem 10 provides means for communicating on a residential access line 100. For example, the residential access line could be a regular telephone line, or a DSL line, and the modem 10 would then be either a dial-up modem or a DSL modem. If the residential access line represents a coaxial cable that also delivers television signals, the modem 10 would be a cable modem. A wireless communication interface 20 provides a means of communication with the other residential units in the neighborhood. It could be a Wireless LAN access point, for example. A collection of wireless interfaces as in 20

comprises the wireless community network 1000 illustrated in FIG. 1 A gateway 30 controls how the wireless network 1000 is used to enhance the utility of the residential access lines 101-104. The gateway 30 could be a stand-alone hardware device, or could be implemented in software and integrated with the wireless interface 20. Alternatively, a software implementation of a gateway could reside on one of the computers 51 or 52. Indeed, as will be clear to those skilled in the art, the modem 10, wireless interface 20, and the gateway 30 can be integrated into one of the computers 51 or 52. These components are kept separate in the following for expositional purposes only. It will be clear to those skilled in the art how to modify the operation of the invention when one or more of these components are integrated with other components.

A residential unit 2001-2004 can represent a house or a unit in an apartment or condominium complex. However, the invention also applies to other clients, such as places of business that use dial-up lines, DSL, or cable modems for access to the Internet.

The web servers 4001, 4002 and the host 4100 represent entities that computers inside residential units 2001-2004 communicate with. For example, when a user browses the web on a computer, web pages are displayed. The web pages contain objects that reside on remote web servers 4001-4002. As another example, a user inside a residential unit may wish to transfer a computer file to or from a remote host 4100.

Without the disclosed invention, transport of these objects is facilitated by a wide area network such as the Internet 3000 and by residential access lines 101-104. Each residential access line is exclusively used for the transport of information originating or terminating at the associated residential unit. A Wireless Community Network (WCN) 1000 is thus used to enhance the performance of the residential access lines 101-104. In the ISP-Aware and Meta-ISP embodiments, a proxy server 5000 is also used to enhance performance, but the proxy server 5000 is not directly used in the ISP-Unaware embodiment. I first describe the ISP-Unaware embodiment.

ISP-Unaware Embodiment

Data transfers in packet networks are often facilitated by session-oriented protocols. In particular, to realize communication between two endpoints, a session may first be initiated, whereby both endpoints communicate initially to synchronize state information for functions such as flow control and error control. This initial communication often takes the form of what is called a three-way handshake. Once both endpoints have synchronized state information, the flow of data can then take place. The transfer of session data packets realizes such data flow. Each session data packet is labeled with an identifier that determines the identity of the session. This identifier is typically determined during the initial state synchronization. Once the data transfer is completed, the end points then exchange control messages to terminate the session.

For example, a very popular session oriented communication protocol in the Internet is the TCP protocol. In this case, a TCP session is identified by an IP address and a port number associated each endpoint. To initiate a session, TCP uses a three-way handshake, whereby special control packets called SYN packets are exchanged, which determine initial sequence numbers used for error recovery and flow control.

Consider a data transfer between a computer 51 and a web server 4001 using a session-oriented protocol, which is initiated by the computer 51. With the disclosed invention, such a session may be altered, without modification of the protocols at the endpoints. In particular, the gateway device 30 attached to the local computer 51 acts as a proxy to facilitate the data transfer, and thus I refer to the gateway device 30 as the local proxy 30. Another proxy, referred to as the remote proxy, also facilitates the data transfer. The remote proxy resides on the gateway device within another residential unit belonging to the same wireless community network 1000. The disclosed invention alters the session in the following way. When the local computer 51 first initiates communication with the web server 4001, the local proxy residing inside the local gateway device 30 intercepts the packets associated with this communication and determines that a session initiation is taking place. The local proxy acts in accordance to how the web server would act, hence the name proxy. In particular, instead of the session taking place between the local computer 51 and the web server 4001, the session takes place between the local computer

51 and the local proxy 30. In order to facilitate the data transfer, the local proxy selects another proxy, called a remote proxy. The remote proxy resides in the gateway device inside another residential unit belonging to the same wireless community network 1000. The selection of the residential unit that contains the remote proxy, among all of the residential units 2001-2004 belonging to the wireless community network 1000, can be made on the basis of the state of the wireless community network 1000 as well as on the basis of the pattern of recent activity on the residential access lines 101-104.

After the local proxy 30 intercepts the packet associated with the session initiation by the local computer 51, the local proxy 30 initiates a session with the remote proxy. This session takes places via the wireless community network. In turn, the remote proxy initiates a session with the web server 4001, via the residential access line attached to the remote proxy. In effect, the remote proxy communicates directly with the web server 4001 instead of the local computer 51.

The remote proxy forwards session data packets from the web server 4001 to the local proxy 30 via the wireless community network 1000, which in turn forwards the session data packets to the local computer 51. Similarly, in the other direction, the local proxy 30 forwards session data packets from the local computer 51 to the remote proxy via the wireless community network 1000, which in turn forwards the session data packets to the web server 4001.

Since some applications and protocols are not session oriented, the local proxy 30 may intercept packets from the local computer 51 which it does not recognize as belonging to any session. In this case the local proxy 30 simply forwards such packets to attached residential access line 100 via the modem 10. Such packets are not transported across the wireless community network 1000.

Meta-ISP Embodiment

The meta-ISP embodiment is similar to the ISP-Aware embodiment, except that gateway devices do not act as remote proxies. Instead, a proxy server, not located in any residential unit, functions as a remote proxy for each residential unit. This proxy server is not necessarily located within any local-ISP, and so this embodiment does not require cooperation from any local-ISP, as in the ISP-Unaware embodiment. The advantage of the meta-ISP embodiment is that traffic can be distributed across the residential access lines 101-104 at the granularity of a packet. Moreover, privacy between residential units 2001-2004 is achieved through encryption.

Consider a data transfer between a computer 51 and a web server 4001 using a session-oriented protocol, which is initiated by the computer 51. Such a session may be altered, without modification of the protocols at the endpoints. In particular, the gateway device 30 attached to the local computer 51 acts as a proxy to facilitate the data transfer, and thus I refer to the gateway device 30 as the local proxy 30. Another proxy, referred to as the remote proxy, also facilitates the data transfer. The remote proxy resides on a proxy server 5000. When the local computer 51 first initiates communication with the web server 4001, the local proxy 30 intercepts the packets associated with this communication and determines that a session initiation is taking place. The local proxy 30 acts in accordance to how the web server would act. In particular, instead of the session taking place between the local computer 51 and the web server 4001, the session takes place between the local computer 51 and the local proxy 30. In order to facilitate the data transfer, the local proxy 30 communicates with the remote proxy at the proxy server 5000. The proxy server 5000 initiates a session with the web server 4001. In effect, the proxy server 5000 communicates directly with the web server 4001 instead of the local computer 51.

The proxy server 5000 forwards session data packets from the web server 4001 to the local proxy 30, which in turn forwards the session data packets to the local computer 51. Similarly, in the other direction, the local proxy 30 forwards session data packets from the local computer 51 to the proxy server 5000, which in turn forwards the session data packets to the web server 4001.

To facilitate communication between the local proxy 30 and the proxy server 5000, any of the residential access lines 101-104 may be used, making use of the wireless community network 1000. The selection of which residential access line to use for a particular packet can be made on the basis of the state of the wireless community network 1000 or the pattern of recent traffic on the residential access lines 101-104, for example. Once the selection is made, the packet can be forwarded accordingly. For example, for a packet received from the web server 4001, the proxy server 5000 can prepend a label to the packet that specifies the gateway device within the residential unit that terminates the selected residential access line. This label can be inserted into the destination address field of a packet whose payload is the packet that is to be transported, for example. The proxy server 5000 then forwards the packet to the gateway device associated with the selected residential access line. Upon receiving the packet, the gateway device then strips the label prepended by the proxy server 5000 off of the packet. The packet is then forwarded through the wireless interface associated with the gateway device, and delivered to the local proxy 30 via the wireless community network 1000. For a packet from a local proxy 30 to the proxy server 5000, this process is simply reversed. In particular, a residential access line 101-104 is selected as before. The local proxy 30 forwards the packet to the wireless interface 20 for delivery through the wireless community network 1000 to the gateway device associated with the selected residential access line, which in turn forwards the packet to the proxy server 5000 via the selected residential access line. The packet is appropriately prepended with labels to facilitate forwarding the packet in the manner just described, as will be clear to those skilled in the art. The local proxy 30 and the proxy server 5000 can periodically communicate in order to facilitate the selection of appropriate residential access lines, and therefore spread the traffic load across the residential access lines, in both directions.

In addition, packets sent from the proxy server 5000 to the local proxy 30 may be labeled with sequence numbers. The local proxy 30 can use the sequence numbers to determine the order in which they were sent by the proxy server 5000, and delay packets appropriately so that they are forwarded to the local computer 51 in the same order that

they were sent by the proxy server 5000. This packet reordering feature may improve the performance of data transfers substantially, due to the fact that many session-oriented protocols assume that the underlying network usually delivers packets in the same order in which they are sent. In the reverse direction, packets sent from the local proxy 30 to the proxy server 5000 may be labeled with sequence numbers. The proxy server 5000 can use the sequence numbers to determine the order in which they were sent by the local proxy 30, and delay packets appropriately so that they are forwarded to the web server 4001 in the same order that they were sent by the local computer 51.

In order to provide privacy, the proxy server 5000 may encrypt packets that are sent to a local proxy 30. When the packets reach the local proxy 30, the local proxy may decrypt the packets before forwarding them to the local computer 51. In the reverse direction, the local proxy 30 may encrypt the packets that are sent to the proxy server 5000. When the packets reach the proxy server 5000, the proxy server may decrypt the packets before forwarding them to the web server 4001. A degree of privacy is thus achieved between the residential units, since the packets traveling through the residential units 2001-2004 are encrypted.

ISP-Aware Embodiment

In the ISP-Aware Embodiment, it is assumed there is only one local-ISP that terminates all of the residential access lines 101-104. This embodiment of the invention is very similar to the meta-ISP embodiment, but differs in that proxy server 5000 resides within the equipment of the local-ISP. Since all external communication to and from the residential units in this case must pass through the local-ISP, the function of the proxy server can be simplified. In particular, when a local computer 51 initiates a session with a

web server 4001, it is no longer necessary to terminate the session at the local proxy 30. Furthermore, the proxy server 5000 no longer needs to initiate a session with the web server 4001 on behalf of the local computer 51.

The gateway device 30 in each residential unit 2001-2004 acts as a local proxy 30. A virtual communication channel is implemented between each local proxy 30 and a proxy server 5000 that resides within the equipment of the local-ISP. Instead of outgoing packets from the local computer 51 being forwarded to the residential access line via the modem 10, such packets are intercepted by the local proxy 30, which in turn forwards them to the proxy server 5000. The proxy server 5000 then forwards the packets to their ultimate destination. In the reverse direction, incoming packets which are destined to a local computer 51 must always be forwarded to the local-ISP. The local-ISP forwards such packets to the proxy server 5000 that it manages. The proxy server 5000 then forwards the packet to the local computer 51 via the local proxy 30 that resides in the same residential unit.

Packets flow between each local proxy 30 and the proxy server 5000 as in the meta-ISP embodiment. In particular, to facilitate communication between the local proxy 30 and the proxy server 5000, any of the residential access lines 101-104 may be used, making use of the wireless community network 1000. The selection of which residential access line to use for a particular packet can be made on the basis of the state of the wireless community network 1000 or the pattern of recent traffic on the residential access lines 101-104, for example. Once the selection is made, the packet can be forwarded accordingly. For example, for a packet from received from the web server 4001, the proxy server 5000 can prepend a label to the packet that specifies the gateway device within the residential unit that terminates the selected residential access line. This label can be inserted into the destination address field of a packet whose payload is the packet that is to be transported, for example. The proxy server 5000 then forwards the packet to the gateway device associated with the selected residential access line. Upon receiving the packet, the gateway device then strips the label prepended by the proxy server 5000 off of the packet. The packet is then forwarded through the wireless interface associated

with the gateway device, and delivered to the local proxy 30 via the wireless community network 1000. For a packet from a local proxy 30 to the proxy server 5000, this process is simply reversed. In particular, a residential access line 101-104 is selected as before. The local proxy 30 forwards the packet to the wireless interface 20 for delivery through the wireless community network 1000 to the gateway device associated with the selected residential access line, which in turn forwards the packet to the proxy server 5000 via the selected residential access line. The packet is appropriately prepended with labels to facilitate forwarding the packet in the manner just described, as will be clear to those skilled in the art. The local proxy 30 and the proxy server 5000 can periodically communicate in order to facilitate the selection of appropriate residential access lines, and therefore spread the traffic load across the residential access lines, in both directions.

In addition, packets sent from the proxy server 5000 to the local proxy 30 may be labeled with sequence numbers. The local proxy 30 can use the sequence numbers to determine the order in which they were sent by the proxy server 5000, and delay packets appropriately so that they are forwarded to the local computer 51 in the same order that they were sent by the proxy server 5000. In the reverse direction, packets sent from the local proxy 30 to the proxy server 5000 may be labeled with sequence numbers. The proxy server 5000 can use the sequence numbers to determine the order in which they were sent by the local proxy 30, and delay packets appropriately so that they are forwarded to the web server 4001 in the same order that they were sent by the local computer 51.

In order to provide privacy, the proxy server 5000 may encrypt packets that are sent to a local proxy 30. When the packets reach the local proxy 30, the local proxy may decrypt the packets before forwarding them to the local computer 51. In the reverse direction, the local proxy 30 may encrypt the packets that are sent to the proxy server 5000. When the packets reach the proxy server 5000, the proxy server may decrypt the packets before forwarding them to the web server 4001. A degree of privacy is thus achieved between the residential units, since the packets traveling through the residential units 2001-2004 are encrypted.

Note that in this embodiment, packets are forwarded between a local proxy 30 and the proxy server 5000 regardless of whether or not they belong to a recognized session. Indeed, a local proxy 30 does not need to be aware of any sessions, but simply forwards packets received from a local computer 51 to the proxy server 5000 in accordance with the mechanism described above.

While specific embodiments of the present invention have been shown and described, it should be understood that other modifications, substitutions and alternatives are apparent to one of ordinary skill in the art. Such modifications, substitutions and alternatives can be made without departing from the spirit and scope of the invention, which should be determined from the appended claims.

Various features of the invention are set forth in the appended claim

Exemplary Claims:

1. A method for providing shared Internet access, the method comprising steps of:

establishing a wireless network of clients, wherein at least some of the clients in the wireless network of clients have a wired Internet connection;

providing a communication protocol between the network of clients;

providing a protocol for sharing the wired Internet connections of the at least some of the clients to clients in the wireless network; and

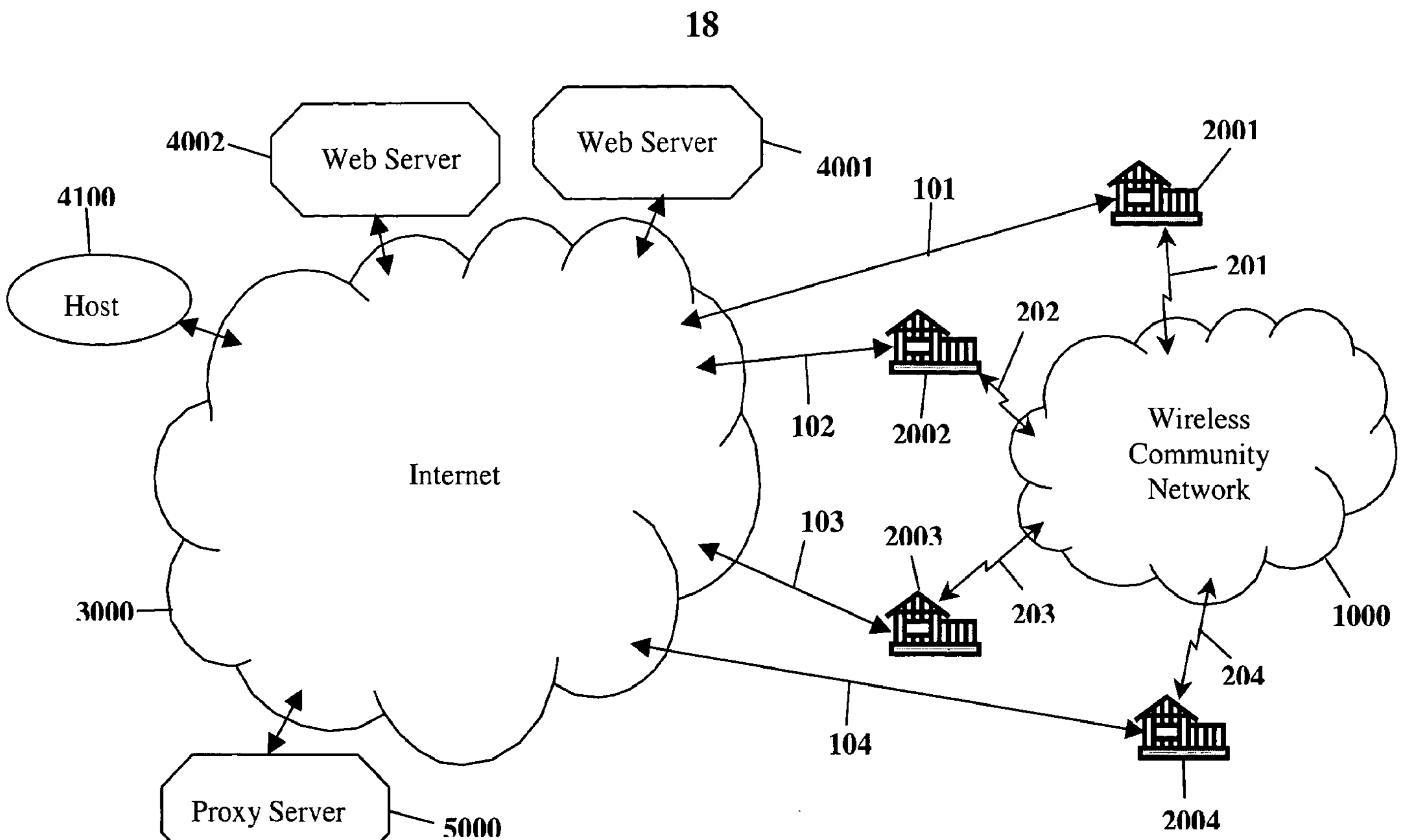
spreading Internet communications from a client in the wireless network of clients among the wired Internet connections of the at least some of the clients in the wireless network.

2. A method for providing shared Internet access, the method comprising steps of:

pooling the wired Internet access resources of a group of clients into a resource available for bursts of traffic to any one or more of the clients in the group of clients by a wireless network among the groups of clients; and

dividing burst of traffic to or from any one of the group of clients across a pool of wired Internet access resources of the group of clients created by said step of pooling.

3. A method according to claim 1 or 2, wherein the clients are residential units co-located in a boundary of a wireless network.


18
Web Server
Web Server
4002
4001
4100
Host
101
2001
201
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Internet
102
2002
Wireless
Community
Network
103
2003
3000
203
1000
204
104
Proxy Server
5000
2004

FIG. 1.

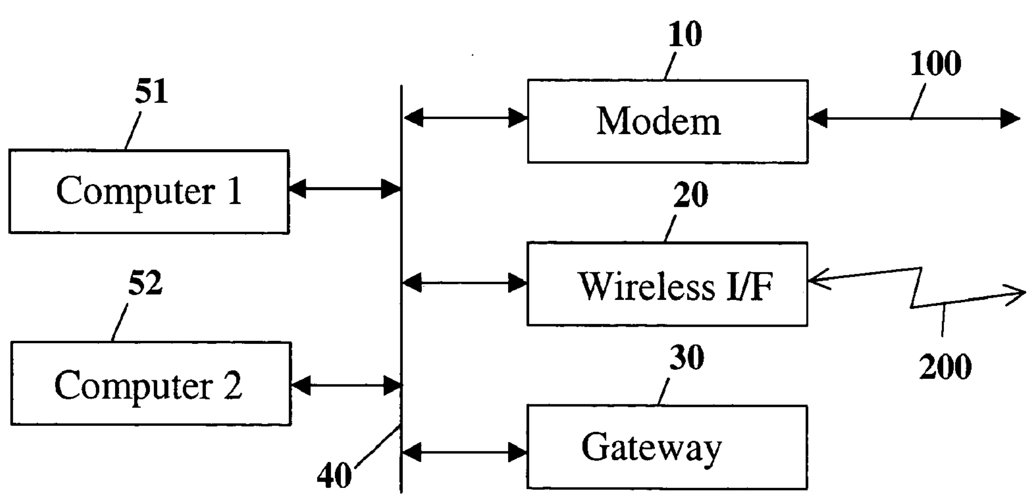
10
100
51
Modem
Computer 1
20
52
Wireless I/F
200
30
Computer 2
40
Gateway

FIG. 2